

# ACM TRANSACTIONS ON DATABASE SYSTEMS

---

Volume 4 • 1979

Editor in Chief      **David K. Hsiao**

Associate Editors      **Rudolf Bayer**  
**David Kuck**  
**Vincent Y. Lum**      **Stuart E. Madnick**  
**Howard L. Morgan**  
**Edgar H. Sibley**

Published by the Association for Computing Machinery

Copyright © 1979, Association for Computing Machinery, Inc.  
1133 Avenue of the Americas, New York, NY 10036

---

Volume 4 • 1979

## Contributed Papers

- 1 Implementing a Relational Database by Means of Specialized Hardware  
by E. Babb
- 30 Computational Problems Related to the Design of Normal Form Relational Schemas  
by Catriel Beeri and Philip A. Bernstein
- 60 Data Abstractions for Database Systems  
by Peter C. Lockemann, Heinrich C. Mayr, Wolfgang H. Weil, and Wolfgang H. Wohlleber
- 76 The Tracker: A Threat to Statistical Database Security  
by Dorothy E. Denning, Peter J. Denning, and Mayer D. Schwartz
- 97 Secure Databases: Protection Against User Influence  
by David Dobkin, Anita K. Jones, and Richard J. Lipton
- 107 Limitations of Record-Based Information Models  
by William Kent
- 133 Optimization of Query Evaluation Algorithms  
by S. Bing Yao
- 156 Linear Queries in Statistical Databases  
by Mayer D. Schwartz, Dorothy E. Denning, and Peter J. Denning
- 168 Optimal Partial-Match Retrieval When Fields Are Independently Specified  
by Alfred V. Aho and Jeffrey D. Ullman
- 180 A Majority Consensus Approach to Concurrency Control for Multiple Copy Databases  
by Robert H. Thomas
- 210 Locking Granularity Revisited  
by Daniel R. Ries and Michael R. Stonebraker
- 228 Partial-Match Hash Coding: Benefits of Redundancy  
by Walter A. Burkhardt
- 240 Experiments on the Determination of the Relationships Between Terms  
by Vijay V. Raghavan and C. T. Yu
- 261 Obituary: Michael E. Senko
- 262 On Semantic Issues Connected with Incomplete Information Databases  
by Witold Lipski, Jr.
- 297 The Theory of Joins in Relational Databases  
by A. V. Aho, C. Beeri, and J. D. Ullman
- 315 Extendible Hashing—A Fast Access Method for Dynamic Files  
by Ronald Fagin, Jurg Nievergelt, Nicholas Pippenger, and H. Raymond Strong
- 345 Properties of Storage Hierarchy Systems with Multiple Page Sizes and Redundant Data  
by Chat-Yu Lam and Stuart E. Madnick
- 368 Efficiently Monitoring Relational Databases  
by O. Peter Buneman and Eric K. Clemons
- 383 Heuristics for Tri Index Minimization  
by Douglas Comer
- 396 Errata: Computational Problems Related to the Design of Normal Form Relational Schemas  
by Philip A. Bernstein

- 397** Extending the Database Relational Model to Capture More Meaning  
by E. F. Codd
- 435** Efficient Optimization of a Class of Relational Expressions  
by A. V. Aho, Y. Sagiv, and J. D. Ullman
- 455** Testing Implications of Data Dependencies  
by David Maier, Alberto O. Mendelzon, and Yehoshua Sagiv
- 470** Pipelining: A Technique for Implementing Data Restructurers  
by Barron C. Housel
- 493** Theseus—A Programming Language for Relational Databases  
by Jonathan E. Shopiro
- 518** Design of a Balanced Multiple-Valued File Organization Scheme with the Least Redundancy  
by S. Yamamoto, S. Tazawa, K. Ushio, and H. Ikeda
- 531** On Searching Transposed Files  
by D. S. Batory
- 545** Comments on "Process Synchronization in Database Systems"  
by Philip A. Bernstein, Marco A. Casanova, and Nathan Goodman
- 547** Index

